CLAIMS

1. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising an image-quality corrector unit for detecting second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance method, wherein said image-quality corrector unit detects at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular patterns.

2. The printer according to claim 1, wherein said image-quality corrector unit sequentially inputs the black and white pixel data representing groups of an attention pixel and a plurality of peripheral pixels, and compares the input data to the irregular patterns registered; and when pattern-matching is detected, said image-quality corrector unit performs area gradation correction for converting an area at a predetermined position in an n-divisional pixel (n = natural number) of the attention pixel and a predetermined number of intrapixel divisional areas to black areas.

3. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising an image-quality corrector unit for detecting isolated pixels that are specific to error-variance method and that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size.

4. The printer according to claim 3, wherein said image-quality corrector unit comprises a plurality of matrix patterns having different sizes, uses the matrix patterns in the order of larger sizes to detect isolated pixels, and distributes the isolated pixels to peripheral pixels according to the sizes of the matrix patterns used to detect the isolated pixels.

5. The printer according to claim 4, wherein said image-quality corrector unit allows the number of distributed peripheral pixels to be increased in proportion to the increase in the size of the matrix pattern used to detect an isolated pixel, and concurrently, allows the size of a reduced distribution pixel to be reduced in inverse proportion thereto.

6. The printer according to claim 3, wherein

said image-quality corrector unit uniformly distributes reduced pixels obtained through reduction in the size of the detected isolated pixel to peripheral pixels in a plurality of directions.

7. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

a first image-quality corrector unit for detecting first irregular patterns that are represented by data included in the black and white pixel data and that are specific to binary processing (binary coding) according to a method other than an error-variance method to thereby smooth the detected first irregular patterns;

a second image-quality corrector unit for detecting second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance method, wherein said image-quality corrector unit detects at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular patterns; and

a controller unit for operating such that the black and white pixel data input to said first image-quality corrector unit is input to said second image-quality corrector unit to be processed thereby when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality corrector unit is used to process the input black and white pixel data by interrupting processing being performed by said second image-quality corrector unit when the black and white pixel data matches one of the first irregularity detection patterns.

8. The printer according to claim 7, wherein said first image-quality corrector unit and said second image-quality corrector unit sequentially input the black and white pixel data representing groups of an attention pixel and a plurality of peripheral pixels, and compares the input data to the first irregular patterns and the second irregularity detection patterns; and when pattern-matching is detected, said first image-quality corrector unit and said second image-quality corrector unit perform area gradation correction for converting an area at a predetermined position in an n-divisional pixel (n = natural number) of the attention pixel and a predetermined number of intrapixel divisional areas to black areas.

9. The printer according to claim 7, further comprising a third image-quality corrector unit for detecting isolated pixels that are specific to the error-variance method and that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size.

10. The printer according to claim 7, wherein said first image-quality corrector unit comprises a plurality of matrix patterns having different sizes, uses the matrix patterns in the order of larger sizes to detect isolated pixels, and distributes the isolated pixels to peripheral pixels according to the sizes of the matrix patterns used to detect the isolated pixels.

11. The printer according to claim 10, wherein said first image-quality corrector unit allows the number of distributed peripheral pixels to be increased in proportion to the increase in the size of the matrix pattern used to detect an isolated pixel, and concurrently, allows the size of a reduced distribution pixel to be reduced in inverse proportion thereto.

12. The printer as according to claim 7, wherein said image-quality corrector unit uniformly distributes reduced pixels obtained through

reduction in the size of the detected isolated pixel to peripheral pixels in a plurality of directions.

13. The printer according to claim 7, wherein said controller unit operates such that the black and white pixel data input to said first image-quality corrector unit is input to said second image-quality corrector unit and subsequently to said third image-quality corrector unit to be processed thereby when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality corrector unit is used to process the input black and white pixel data by interrupting processing being performed by said second image-quality corrector unit and processing being processed by said third image-quality corrector unit when the black and white pixel data matches one of the first irregularity detection patterns.

14. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

a first image-quality corrector unit for detecting first irregular patterns that are represented by data included in the black and white pixel data and that are specific to a method other

than an error-variance method to thereby smooth the detected first irregular patterns;

a third image-quality corrector unit for detecting isolated pixels that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size; and

a controller unit for operating such that the black and white pixel data input to said first image-quality corrector unit is input to said third image-quality corrector unit to be processed thereby when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality corrector unit is used to process the input black and white pixel data by interrupting processing being performed by said third image-quality corrector unit when the black and white pixel data matches one of the first irregularity detection patterns.

15. A printing method for performing correction to improve the quality of images represented by input binary black and for printing the images, wherein detection is performed for second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance

method such that detection is performed for at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular patterns.

16. A printing method for performing correction to improve the quality of images represented by input binary black and for printing the images, wherein detection is performed for isolated pixels that are specific to error-variance method and that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size.

17. A printing method for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

a first image-quality correction step for detecting first irregular patterns that are represented by data included in the black and white pixel data and that are specific to binary processing (binary coding) according to a method other than an error-variance method to thereby smooth the detected first irregular patterns;

a second image-quality correction step for

detecting second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance method, wherein said image-quality correction step detects at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular patterns; and

a control step for operating such that the black and white pixel data input to said first image-quality correction step is input to said second image-quality correction step to be processed thereby when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality correction step is used to process the input black and white pixel data by interrupting processing being performed in said second image-quality correction step when the black and white pixel data matches one of the first irregularity detection patterns.

18. A printing method for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

a first image-quality correction step for detecting first irregular patterns that are represented by data included in the black and white pixel data and that are specific to a method other than an error-variance method to thereby smooth the detected first irregular patterns;

a second image-quality correction step for detecting second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance method, wherein said image-quality correction step detects at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular patterns;

a third image-quality correction step for detecting isolated pixels that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size; and

a control step for operating such that the black and white pixel data input to said first image-quality correction step is input to said third image-quality correction step to be processed

therein when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality correction step is used to process the input black and white pixel data by interrupting processing being performed in said second image-quality correction step and said third image-quality correction step when the black and white pixel data matches one of the first irregularity detection patterns.

19. A printing method for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

an image-quality correction step for detecting irregular patterns that are represented by data included in the black and white pixel data and that are specific to a method other than an error-variance method to thereby smooth the detected irregular patterns;

a pixel-distribution step for detecting isolated pixels that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size; and

a control step for operating such that the black and white pixel data input to said image-

quality correction step is input to said pixel-distribution step to be processed therein when the black and white pixel data does not match one of the first irregularity detection patterns, and said image-quality correction step is used to process the input black and white pixel data by interrupting processing being performed in said pixel-distribution step when the black and white pixel data matches one of the first irregularity detection patterns.

20. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising:

a scale-varying processor unit for varying the size of an original image optically scanned to a predetermined image size by performing pixel-removal processing;

a binary unit for converting the size-varied image into black and white pixel data according to an error-variance method; and

an image-quality corrector unit for detecting irregular patterns that are represented by data included in the black and white pixel data and that are specific to an error-variance method, wherein said image-quality corrector unit detects at least one type of substantially vertical vertical-line

irregular patterns caused through the pixel-removal processing, substantially vertical vertical-edge irregular patterns, substantially horizontal horizontal-line irregular patterns, substantially horizontal horizontal-edge irregular patterns; and thin-line patchy patterns to thereby smooth the detected patterns. to thereby smooth the detected patterns.

21. The printer according to claim 20, wherein said scale-varying processor unit magnifies the size of the original image to a predetermined image size according to pixel-interpolation, and then reduces the magnified image size to the predetermined image size by performing the pixel-removal processing.

22. The printer according to claim 20, wherein said scale-varying processor unit detects a gradient variation of a pixel-removal-candidate attention pixel with respect to peripheral pixels, does not perform pixel-removal processing when the gradient variation is relatively great, and performs pixel-removal processing when the gradient variations are relatively small.

23. The printer according to claim 20, wherein said scale-varying processor unit defines a matrix having a predetermined size for a pixel-removal-candidate attention pixel, calculates the

sum of absolute values representing the difference between the pixel-removal-candidate attention pixel and peripheral pixels belonging to the matrix as a gradient variation amount, does not perform the pixel-removal processing when the gradient variation amount is equal to or greater than a predetermined threshold, and performs pixel-removal processing when the gradient variation amount is less than the threshold.

24. The printer according to claim 20, wherein said scale-varying processor unit does not perform remove a removal-candidate pixel either when the level of the removal-candidate pixel is bright, and the overall tone of peripheral pixels thereof is dark; or when the level of the removal-candidate pixel is dark, and the overall tone of peripheral pixels thereof is bright.

25. The printer according to claim 20, wherein said image-quality corrector unit inputs the black and white pixel data representing groups of an attention pixel and a plurality of peripheral pixels, and performs comparison of the input data to the irregular patterns registered; and when pattern-matching is detected, said image-quality corrector unit performs area gradation correction for converting an area at a predetermined position in an n-divisional pixel (n = natural number) of

the attention pixel and a predetermined number of intrapixel divisional areas to black areas.